

## REMARKS/ARGUMENTS

Claims 1, 3-12, 14-21 and 23-26 remain in the application, all of which stand rejected. Claims 1, 3-5, 7, 8, 14-16, 21 and 23-26 have been amended. The amendments to the claims are fully supported by the application as originally filed. Claims 2, 13, 22, 27 and 28 have been canceled without prejudice or disclaimer. Applicants reserve the right to file a continuation application directed to the subject matter of the canceled claims

### 1. Rejection of Claims 1-28 Under 35 U.S.C. 112, Second Paragraph

Claims 1-28 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention

With respect to paragraph (a) set forth on page 2 of the Office Action, claims 1, 7 and 8 have been amended to recite proper Markush format. The phrase "selected from the group comprising" has been amended to recite "selected from the group consisting of."

With respect to paragraph (b) set forth on page 2, claim 21 has been amended to recite the phrase "chemically bonded" in place of the phrase "chemically linked." Support for this amendment may be found throughout the specification as originally filed including, e.g., page 10, lines 27 and 28.

With respect to paragraph (c) set forth on pages 2 and 3 of the Office Action, claims 27 and 28 have been canceled from the instant application.

With respect to paragraph (d) set forth on page 3 of the Office Action, Applicants respectfully submit that the term "keratin fractions" as used in the instant application means intermediate filament protein, high sulfur protein and high glycine-tyrosine protein. Therefore, the limits of the term "keratin fractions" as used in the instant application are sufficiently defined.

The definition for the term "keratin fractions" as used in the instant application is set forth on page 9, lines 10-21 of the specification of the instant application.

Specifically, this portion of the specification states in part that “[f]or the purpose of this invention a ‘keratin protein fraction’ is a purified form of keratin that contains... one distinct protein group as described above,” where the groups described above are intermediate filament protein, high sulfur protein and high glycine-tyrosine protein.

Furthermore, Applicants direct attention to page 2, lines 24-33 of the specification of the instant application, which states that protein fractions of keratin can be grouped into three categories, namely the intermediate filament protein family, the high sulfur protein family, and high glycine-tyrosine protein family. This further indicates that the only three types of keratin fractions are intermediate filament protein, high sulfur protein and high glycine-tyrosine protein. Applicants note that the term “keratin fractions” as used in the instant application is not synonymous to keratin peptides or shorter fragments of a keratin protein chain (i.e., the result of fractionation), and that such peptides or fragments are specifically excluded from the term “keratin fractions” as used in the instant application.

Accordingly, contrary to the position taken in the Office Action, Applicants have not arbitrarily selected examples of keratin fractions, but rather, have clearly defined the term keratin fractions and set forth its limits such that one of ordinary skill in the art would be able to understand the species included within the keratin fraction genus.

For at least the foregoing reasons, Applicants respectfully request that the rejection of claims 1-28 under 35 U.S.C. 112, second paragraph, be withdrawn.

## 2. Objection of Claims 2, 13 and 22

Claims 2, 13 and 22 have been objected to because the “s” in “s-sulfonated” is not capitalized to thereby indicate that the S is the element sulfur in the moiety -S-SO<sub>3</sub><sup>-</sup>. Claims 2, 13 and 22 have been canceled from the instant application.

For at least the foregoing reason, Applicants respectfully request that the objection to claims 2, 13, and 22 be withdrawn.

### 3. Rejection of Claims 21-25 Under 35 U.S.C. 102(b)

Claims 21-25 stand rejected under 35 U.S.C. 102(b) as being anticipated by JP 54-137064.

The Office Action urges that JP 54-137064 discloses graft polymerizing acrylonitrile onto keratin material such as wool. The Office Action further urges that wool fibers would be expected to have at least a non-zero amount of S-sulfonation.

Applicants respectfully disagree. Natural, untreated keratin does contain the moiety  $-S-SO_3^-$ . As clearly stated in the JP reference, natural, untreated keratin possesses  $-S-S-$  bonds. When reduced, as also clearly stated in the JP reference, the  $-S-S-$  bonds are cleaved to create thiol groups ( $-SH$ ). Reduction of keratin does not result in the formation of any  $-S-SO_3^-$  groups. Keratin must undergo a specific chemical treatment, such as oxidative sulfitolysis, to create S-sulfonated keratin and  $-S-SO_3^-$  groups. The JP reference does not disclose this specific chemical treatment, and therefore does not disclose a S-sulfonated keratin protein chemically bonded to a monomer or polymer material as recited in claim 21.

The Official Action also urges that wool fiber recommended in the JP reference would also have some content of fibers within the intermediate filament protein family.

Applicants respectfully disagree. As discussed in Section 1 above, the instant application sets forth a specific definition for keratin protein fractions. This definition indicates that keratin protein fractions are purified forms of keratin that contain predominantly, although not entirely, one distinct protein group (e.g., intermediate filament protein). Thus, in order for the JP reference to be considered to disclose keratin protein fractions as the term is used in the instant application, and more specifically intermediate filament protein as the term is used in the instant application, the keratin protein fraction must be in a purified form, *i.e.*, extracted from the whole keratin protein. The JP reference does not disclose such purified forms of keratin, and therefore does not disclose keratin fractions as recited in claims 23 and 24.

Applicants believe claims 21, 23 and 24 are allowable, at least, for the foregoing reasons.

Applicants believe claim 25 is allowable, at least, because it depends from claim 21.

#### 4. Rejection of Claims 1-5 Under 35 U.S.C. 102(b)

Claims 1-5 stand rejected under 35 U.S.C. 102(b) as being anticipated by Schnetzinger et al (U.S. Pat. No. 5,071,441).

The Office Action urges that Schnetzinger discloses contacting human or animal hair keratin with poly vinyl polypyrrolidone. The Office Action further urges that human or animal hair fibers would be expected to have at least a non-zero amount of S-sulfonation.

Applicants respectfully disagree. Natural, untreated keratin does contain the moiety  $-S-SO_3^-$ . As noted above in Section 3, natural, untreated keratin possesses  $-S-S-$  bonds. When reduced, as taught in Schnetzinger (see col. 1, lines 42-46), the  $-S-S-$  bonds are cleaved to create thiol groups ( $-SH$ ). Reduction of keratin does not result in the formation of any  $-S-SO_3^-$  groups. Keratin must undergo a specific chemical treatment, such as oxidative sulfitolysis, to create S-sulfonated keratin and  $-S-SO_3^-$  groups. Schnetzinger does not disclose this specific chemical treatment, and therefore does not disclose an intimate mixture of S-sulfonated keratin protein and water soluble polymers as recited in claim 1.

The Official Action also urges that the recommended human or animal hair keratin would also have some content of fibers within the intermediate filament protein family.

Applicants respectfully disagree. As discussed in Section 1 above, the instant application sets forth a specific definition for keratin protein fractions. This definition indicates that keratin protein fractions are purified forms of keratin that contain predominantly, although not entirely, one distinct protein group (e.g., intermediate filament protein). Thus, in order for Schnetzinger to be considered to disclose keratin protein fractions as the term is used in the instant application, and more specifically intermediate filament protein as the term is used in the instant application, the keratin protein fraction must be in a purified form, *i.e.*, extracted from the whole keratin

protein. Schnetzinger does not disclose such purified forms of keratin, and therefore does not disclose keratin fractions as recited in claims 3 and 4.

Applicants believe claims 1, 3 and 4 are allowable, at least, for the foregoing reasons.

Applicants believe claim 5 is allowable, at least, because it depends from claim 21.

#### 5. Rejection of Claims 1-8, 13-16 and 20 Under 35 U.S.C. 102(b)

Claims 1-8, 13-16 and 20 stand rejected under 35 U.S.C. 102(b) as being anticipated by CN 1425813.

The Office Action urges that the CN reference discloses a process for providing a solution of keratin and PVA, wet spinning into a fiber, and heating. The Office Action further urges that animal keratin would be expected to have at least a non-zero amount of S-sulfonation.

Applicants respectfully disagree. Natural, untreated keratin does contain the moiety  $-S-SO_3^-$ . As noted above in Section 3, natural, untreated keratin possesses  $-S-S-$  bonds. Keratin must undergo a specific chemical treatment, such as oxidative sulfitolysis, to cleave the  $-S-S-$  bonds and create S-sulfonated keratin and  $-S-SO_3^-$  groups. Dissolving keratin in water, regulating the pH to between 8.5 and 12, concentrating the solution and dissolving PVA therein is not a chemical treatment that will result in the formation of  $-S-SO_3^-$  groups. Therefore, the CN reference does not disclose an intimate mixture of S-sulfonated keratin protein and water soluble polymers as recited in claim 1.

The Official Action also urges that the recommended animal keratin would also have some content of fibers within the intermediate filament protein family.

Applicants respectfully disagree. As discussed in Section 1 above, the instant application sets forth a specific definition for keratin protein fractions. This definition indicates that keratin protein fractions are purified forms of keratin that contain predominantly, although not entirely, one distinct protein group (e.g., intermediate filament protein). Thus, in order for the CN reference to be considered to disclose

keratin protein fractions as the term is used in the instant application, and more specifically intermediate filament protein as the term is used in the instant application, the keratin protein fraction must be in a purified form, *i.e.*, extracted from the whole keratin protein. The CN reference does not disclose such purified forms of keratin, and therefore does not disclose keratin fractions as recited in claims 3, 4, 14 and 15.

Applicants believe claims 1, 3, 4, 7, 8, 14 and 15 are allowable, at least, for the foregoing reasons.

Applicants believe claims 5, 6, 13 and 16 are allowable, at least, because they depend from either claim 1, claim 7 or claim 8.

#### 6. Treatment of Claims 9-12 and 17-19


While claims 9-12 and 17-19 have been rejected as being indefinite by virtue of their dependence on an alleged indefinite claim, none of claims 9-12 or 17-19 have been rejected over prior art. As all of the indefiniteness issues have been addressed and overcome as discussed in Section 1 above, Applicants respectfully submit that claims 9-12 and 17-19 recite allowable subject matter. Confirmation that claims 9-12 and 17-19 recite allowable subject matter in the next Official Action is respectfully requested.

#### 7. Conclusion

In light of the amendments and remarks provided herein, applicants respectfully request the issuance of a Notice of Allowance.

Respectfully submitted,  
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